Outbreak Indian Tick Typhus amongst residents of Deol village, District, Kangra, Himachal Pradesh (INDIA)

**Kaushal Kumar, *S.K.Jain and *Abhay Kumar

**Centre For Medical Entomology and Vector Management , National Centre For Diseases Control, 22, Sham Nath Marg, Delhi 110054 (India).*
**Centre for Medical Entomology and Vector Management, National Centre For Diseases Control, 22, Sham Nath Marg, Delhi 110054 (India)*

ABSTRACT

An epidemiological and entomological investigation of tick typhus outbreak in village, Deol District Kangra (Himachal Pradesh) was undertaken with the aim to determine the occurrence of outbreak in the area and to reinforce control measures for the continent of diseases. During the outbreak a total of 357 cases of acute febrile illness among the total 1223 population was reported. The methodology used was to review of the records of health facilities, rapid fever survey in affected and non affected village, entomological survey for collection of ticks from domestic animals/rodents serological investigation and study of eco-epidemiological feature of the study area.

Based on the working case definition, clinical features, symptomatology, serological evidence in the form of IgM antibodies in patient serum, presence of vector species in good number it was concluded that an episode of Indian Typhus has occurred in the village Deol, District Kangra (H.P.) during July 2007. Details of the finding are discussed in the communication. Action taken by local health authorities and recommendations for containment of outbreak has been discussed.

INTRODUCTION

Rickettsiosis is known as oldest and most recently recognized disease in India. In India an outbreak during spring near Bunji in Gilgit is the earliest report of epidemic typhus mentioned in Medical Administrative reports of Jammu and Kashmir State (1804).The origin of tick typhus in India can be traced directly to Col. Megaw, who narrated his own experience of tick bite and his subsequent illness. The isolation of Rickettsiae has been done successfully from Ixodid pools; *Haemaphysalis leachi variety indica* from Imphal, *Ixodes ricinus* from Almora and *Rhipicephalus sanguineus* from Srinagar.[1,2]

Indian tick typhus infection is widely prevelant in the hilly forest tract in different parts of India and sero-epidemiologically the infection has been reported from various parts of the country like Nagpur, Jabalpur, Jammu and Kashmir, Kanpur, Sagar, Pune, Lucknow and Banglore.[1]

Address for correspondence:
Phone No. (Off.) 011-23912963
Cell No: 09810317646
E-mail: dr.kaushalk@yahoo.com

DOI: 10.5530/ijmedph.3.2011.11

During July 2007 amongst 1223 residents of Deol village, Kangra district, Himachal Pradesh, 357 cases of acute febrile illness, was reported. This localized fever episode was investigated by a team of an epidemiological and entomological from the than NCDC (Formerly NICD) with the objective:

To determine if an outbreak has occurred in the area: To determine the occurrence of outbreak and to review and reinforce control measures based on the findings:

The results of the investigation are presented in the manuscript.

Study area

Kangra is one of the twelve districts of Himachal Pradesh situated in the eastern part of Himachal Pradesh. The district has an area of 5739 Sq. km. and a population of more than 1.3 million. It is situated about 526-km north-west of New Delhi. Dharamshala is the headquarters of the Kangra.

The affected village Deol is situated at a distance of about 60 kms from district headquarter and 8 kms from Baijnath the nearest town. The village is connected by a motorable road in hilly terrain. Sanitation and hygiene in general was poor. The population of the village was 1223 as per 2001 census. An Ayurvedic dispensary with one medical officer

is located in the village. The following were the ecological and other observation in the village:

- The source of water supply was predominantly tap water.
- Defecation in open field is the general practice.
- Cases were reported to the outpatient of Ayurvedic dispensary located in the village.
- The houses in the village are of made-up of brick walls and roof with tin shade.
- The main occupation of the villagers is sheep rearing by Gadaria tribes and as laborer in agricultural activities. The sheep's along with man folk goes to higher altitudes during April months and returned with the onset of winter during October/November. The sheep's went this year in April to higher altitudes has not returned back till the visit of survey team.

MATERIAL AND METHODS

Studies were undertaken by visiting the affected village and carried out clinical examination of cases. Local medical officers, health workers and community leaders were interacted to get the back ground information and assess the magnitude of the problem.

The persons who were ill and reporting to the local health facility or recovered were clinically examined and clinical specimens were collected as per the standard procedure. The record of the local health facility was reviewed of the fever cases reported during the last 3 years. A rapid fever survey covering all the households in the affected Deol village and a nearby unaffected village Sirajra was carried out for the rapid health assessment. The team also carried out eco-entomological survey of the affected area and collected ticks from domestic animals by hand pick method. Rodent trapping was done in the village covering domestic and per-domestic situations to collect ectoparasites (Tick, mites, flea and lice) as per the standard procedure.[3]

RESULTS AND DISCUSSION

Analysis of month wise number of fever cases reported to the local Ayurvedic dispensary situated in the Deol village from 2004 onwards indicate that during 2007, the number of fever cases started increasing from the month of May onwards and reached its peak in July 2007 (figure 1).

During July 2007, a total of 357 cases of fever were reported in the Ayurvedic dispensary of Deol village as compare to 40 cases during July 2006. During 1st to 3rd August 2007 (teams visiting period), 24 fever cases were reported to the dispensary. Period distribution of 381 cases reported during 1 July to 3 August 2007 shows that maximum cases were reported during the period 15 July to 28 July 2007, after this the cases started declining. Week-wise distribution of cases is shown in figure 2.

Community Survey

After interaction with the persons who were still ill/ recovered and clinical examination of patients based on

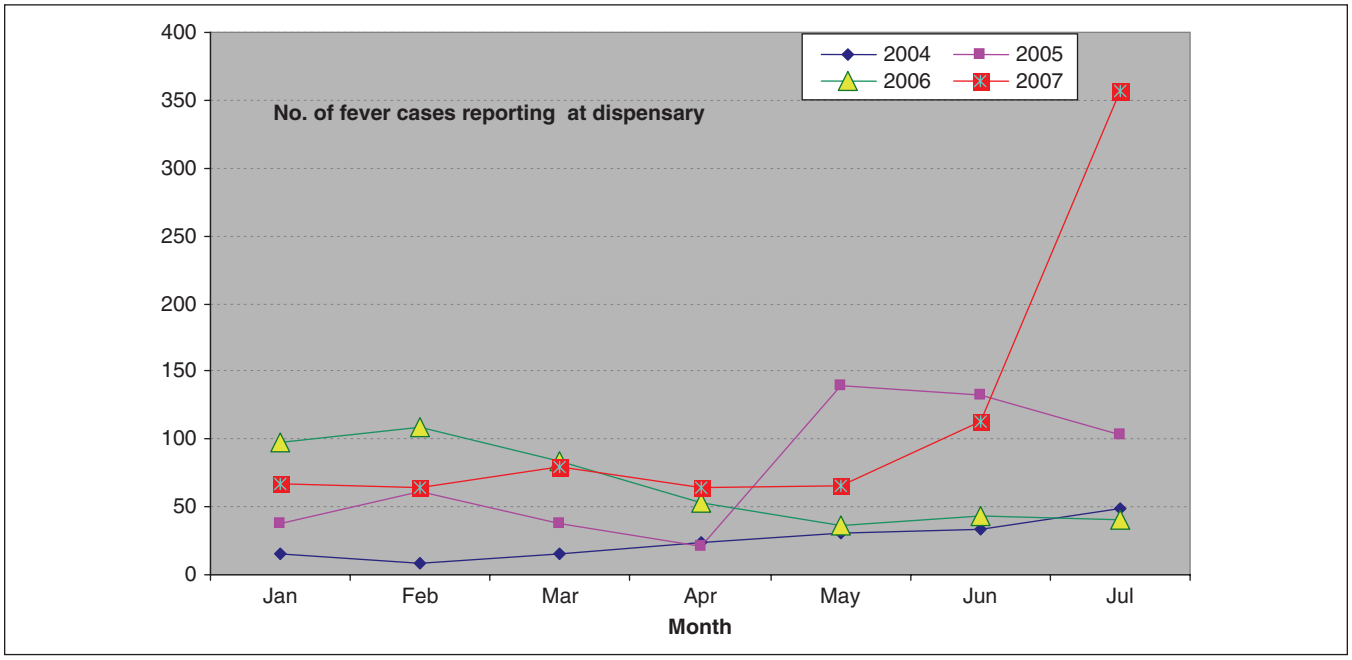

Figure 1: Month wise distribution of fever cases, Deol Village, Kangra district, Himachal Pradesh, 2004 to 2007

the history and clinical presentation a working case definition given below was developed to gather further information about the cases.

'Any person residing in the village Deol who had or develop fever with one of the following chills, headache and cough during the month of July 2007'.

A total of 245 households in two villages (209 households in affected village - Deol and 36 households in a nearby unaffected village - Sarajra) were surveyed using this case definition. The survey covered a total of 945 population in affected village and 153 in the unaffected village. The information on the epidemiological and clinical aspects was recorded on a pre-designed proforma.

Age and sex distribution of cases

It was found that cases were in all age groups affecting both male and females. Over all 25.5% persons of this village suffered with acute febrile illness during 1 July to 3 August 2007. The attack rate of fever was more among persons 1-14 years of age. The attack rate of fever in this age group was 41% as compared to 21.1% in other age groups (Table 1).

Distribution of cases by place

A total of 209 households covering all parts of the village were surveyed and 60.3% households reported one or more fever cases in the last one month. About half (46.8%) of these households had reported multiple case i.e. more than one case of fever in their family.

Clinical features

The disease had an abrupt onset. The main presenting features were fever with chills, headache, and cough (Table 2). No history of rash and haemorrhagic manifestations was found in any case. There was no history of loose motion or vomiting.

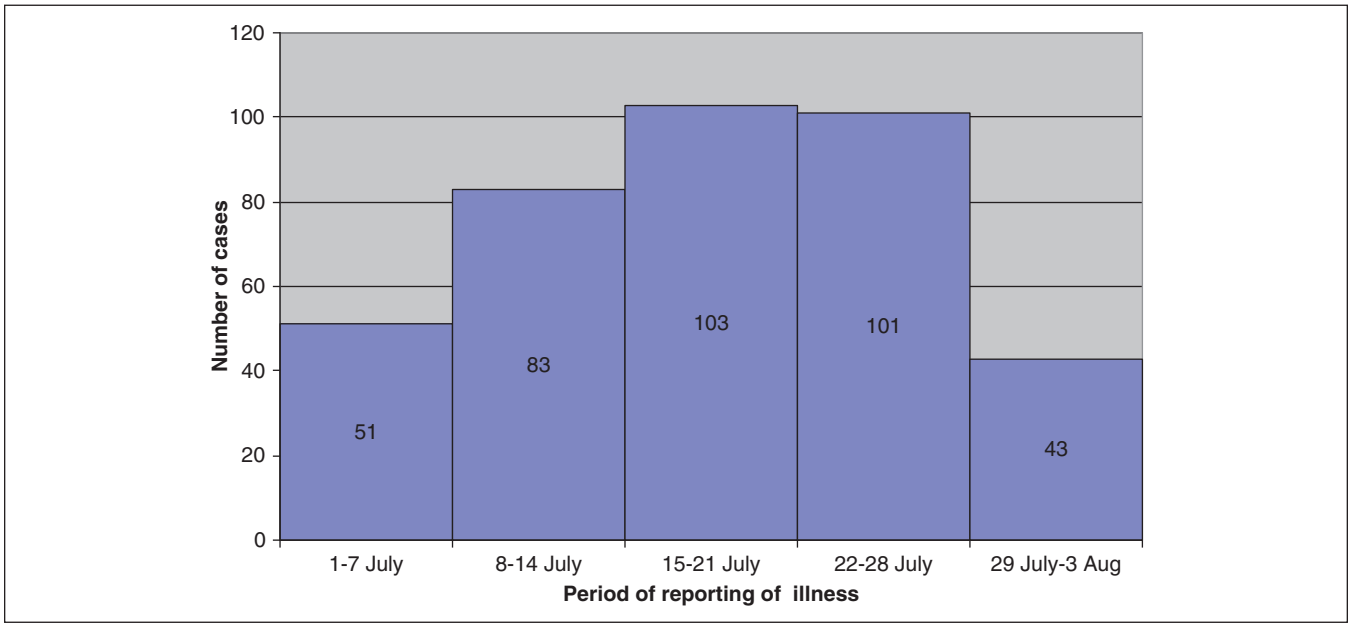

Figure 2: Week wise distribution of 381 cases of acute febrile illness reporting to the outpatient health facility, Deol village, Kangra district, 1 July – 3 August, 2007

Table 1: Age and sex distribution of cases, acute febrile illness in Deol village, Kangra district, Himachal Pradesh, 1 July – 3 August 2007, (*n* = 241)

Age (Yrs.)	Population surveyed			Fever No. (%)		
	Male	Female	Total	Male	Female	Total
<1	9	7	16	1 (11.1)	0 (0.0)	1 (6.3)
1-4	26	22	48	8 (30.8)	9 (40.9)	17 (35.4)
5-14	86	76	162	36 (41.9)	33 (43.4)	69 (42.6)
15-29	142	152	294	33 (23.2)	43 (28.3)	76 (25.9)
30-44	97	110	207	13 (13.4)	24 (21.8)	37 (17.9)
45-59	71	62	133	12 (16.9)	18 (29.0)	30 (22.6)
> = 60	43	42	85	6 (14.0)	5 (11.9)	11 (12.9)
Total	474	471	945	109 (23.0)	132 (28.0)	241 (25.5)

The fever did not respond to Ofloxacin or Cefixime prescribed by the local medical officer. However, all the fever cases responded to Doxycycline and supportive treatment. There was no residual motor/neurological deficit. No death due to this acute febrile illness was reported from this village.

No significant history of previous such episode, movement of population, festival/fair, vaccination in recent past as well as consumption of drugs could be elicited from study of case studies records, interview of relatives of the cases and district health officials.

Situation in the unaffected village –Sirajara:

During the community survey covering 153 population in 36 households in village Sarajra , no such fever cases was found. The fever rate in this village was found to be 2.6% in the month of July, 2007.

Entomological Investigations:

Ixodid Ticks were collected from a total 139 domestic animals (cow 60, goat 35, sheep 08 and dog 11) revealed the presence of *Rhipicephalus sanguineus, Boophilus microplus and Haemaphysalis bispinosa. Rhipicephalus sanguenius* is the proven vector of Indian Tick typhus in the hilly forest tract of the country. *Ixodes ricinus* was collected from *Suncus murinus* (Rodent) caught during the rodent tapping in the village. Village wise and animal wise details of the ticks collected is given in the table 3.

Table 2: Symptomatology of cases of acute febrile illness, Deol Village, Kangra district, Himachal Pradesh, July- August, 2007 (*n* = 241)

Clinical features	No. (%)
Fever	241 (100)
Chills	213 (88.4)
Headache	103 (42.7)
Cough	24 (10)

Rodent trapping were done in Deol village. A total of 138 traps (18 wire cage trap and 120 break back traps) were laid to catch the rodents. 8 traps were found positive giving an over all trap positivity rate of 5.07 percent. From the traps a total of 8 rodents comprising of *Rattus rattus* (5) and *Suncus murinus* (3) were retrieved. Only one *Suncus murinus* was found positive for the presence of Trombiculid mite (Vector of Scrub Typhus) and one for ticks (*Ixodes ricinus*), no flea and lice was found on the rodents.

Laboratory Investigations

Results of the sixteen sera samples drawn from patients by state health authorities showed ten samples positive for IgM antibodies against *Rickettsia conorii* indicating recent infection of Indian tick typhus.

A total of another five serum samples were collected by the team during investigation (4 sera and 1 one blood sample in glucose broth). Of the 4 sera samples collected, two were from convalescing patients (second samples from patients found IgM antibodies positive for *R. conorii* earlier) and rest two from new cases of the fever.

Both the second serum samples from convalescent patients tested positive for *R. conorii* where as the serum samples from new patients were negative.

Table 3: Prevalence of ticks collected in Village Deol and Sirajara PHC-Bir, District Kangra (Himachal Pradesh) during August, 2007

S. N.	Host Examined/ Found +ve	Total ticks collected					Tick Species
		Male	Female	Nymph	Larva	Total	
	Village – Deol , PHC-Bir, District Kangra (Himachal Pradesh)						
1.	Cow (48/10)	18	28	02	–	48	*Boophilus mocroplus*
	*Goat (25/12)	26	12	–	–	38	*Haemaphysalis bispinosa*
		06	04	–	–	10	*Rhipicephalus sanguineus*
	Sheep (08/03)	08	03	–	–	11	*Haemaphysalis bispinosa*
	Dog (09/04)	08	05	–	–	13	*Rhipicephalus sanguineus*
	Total (90/29)	**66**	**52**	**02**	**–**	**120**	
	Village – Sirajara, PHC-Bir, District Kangra (Himachal Pradesh)						
2.	Dog (02/01)	02	01	–	–	03	*Rhipicephalus sanguineus*
	Goat (05/01)	03	02	–	–	05	*Haemaphysalis bispinosa*
	Cow (12/04)	04	10	–	–	14	*Boophilus mocroplus*
	Total (19/06)	**09**	**13**	**–**	**–**	**22**	
	Grand total (109/35)	**75**	**65**	**02**	**–**	**142**	

*10 specimens of *Ctenocephaloides canis* were also collected from goat

Action Taken by Local Health Authorities to contain the outbreak:

- The local Health officials have taken following actions; District and local health officials have organized a 24 hour camp in the Ayurvedic dispensary of this village to monitor the situation and provide symptomatic treatment to the affected population (including Doxycycline distribution). Appropriate case management was done of the new cases.
- Surveillance activities were strengthen through active search for cases and monitored daily reporting
- Medicines required for the treatment of these cases were made available in sufficient quantity.
- IEC for creating community awareness for early reporting of suspected cases.

DISCUSSION

Indian tick typhus is a disease of the spotted fever group of Rickettsiae, which is usually spread by the bite of infected ticks. This is one of the 12 rickettsiosis recognized world wide.[4] The causative agent is *Rickettsia conorii*. The etiological agent was first isolated from India in 1950 from a brown dog tick, *Rhipicephalus sanguineus* 5. The disease is characterized by sudden onset of moderate to high fever which gradually persists for 2-3 week in untreated case, significant malaise, deep muscle pain, severe headache, chills and conjunctival infection. A maculopapular rash start on 3rd day on extremities then, moves centripetally and involves rest of the body. Incubation period of the disease is 3-7 days. During the present episode no history of rash and hemorrhagic manifestations was found in any case. No tick bite mark (Eschar) could be observed in any patient this is similar with the earlier observations wherein, it was stated that tick typhus disease in India is known as mild to moderately severe.[4,5] Single and multiple eschar and rashes were prominent symptoms of tick typhus cases reported from elsewhere.[6] Himachal Pradesh is an endemic area for *Ricketssiosis* (scrub typhus) and during 2003, a total of 113 cases and 19 deaths were reported in eight districts of the state 3.

Fever cases suggesting Typhus group of fever in the villagers of all society and age group are distributed far and wide in the village. Ecologically terrain features of the village are congenial and supportive for the propagation and development of tick vector of Typhus fever.

Deol, Village having hilly forest tract , supporting propagation and multiplication of vector ticks population, clinically, epidemiologically and entomologically is supportive of moderate and less severe out break of Rekettsiosis. Laboratory findings of IgM antibodies in the patients serum further suggest that the present episode of fever outbreak was of Indian tick typhus . Presence of tick vector *Rhipcephalus sanguenieus* in good number and presence *of Ixodes ricinus* on rodent also is supportive for the existence of tick typhus in the area. However, further studies are needed for the isolation of *rickettsia* from vector ticks to determine the exact origin and phylogeny of the *ricekttsia* strain prevalent in this part of India.

REFERENCES

1. Padbidri VS, Gupta NP. Rickettsiosis in India, A review. J Indian Med Assoc 1978; **71**:104-107.
2. Kalra SL and Rao KNA. Typhus Fevers in Kashmir State. Indian J Medical Res. October, 1949 vol. **37**.
3. Kaushal K, Saxena VK, Thomas TG, and Shiv Lal Outbreak investigation of Scrub Typhus in Himachal; Pradesh (India) J Comm Dis 2004 **36** (4):277.
4. Raoult D, Roux V. Rickettsioses as paradigms of new or emerging infectious diseases. Clinical Microbiol Rev. 1997 **10**:694-719.
5. Philip CB, Hughes LE, Rao KNA, Kalra SL. Studies on Indian Tick typhus and its relation to other human, typhus-like rickettsiosis. Arquivos do congresso International de Microbilogia, Rio de Janerio, 17-24 Augosto 1958 **1**:571.
6. Park's Textbook on Preventive and Social Medicine, Ed.18th Park K, Page 241.
7. Mahajan SK, Kashyab R, Sankhayan N, Sharma V, Rolain JM, Prasher BS and Raoult D. Spotted fever group Rickettsisosis in Himachal Pradesh JAPI. Dec. 2007 **55**:868-870.
8. Panda, GS Rickettsiosis in India. J. Kazar and R. Toman (ed.) Rickettsiae and Rickettsial diseases. Veda, Bratislava. 1996: Slovakia 106-109.